

RESURRECTION OF THE GENUS *MORPHEIS* (COSSIDAE),  
WITH DESCRIPTION OF A NEW SPECIES IN THE  
*COGNATUS* GROUP FROM SOUTHERN ARIZONA

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**ABSTRACT.** The New World genus *Morpheis* Hübner is resurrected and distinguished from the Old World genus *Xyleutes* Hübner, with *Neocossus* Houlbert and *Xylotrypa* Turner as synonyms of *Morpheis*. A new classification is proposed for the 12 known species of *Morpheis*, of which 10 are new combinations. *Morpheis clenchi* (Santa Cruz Co., Arizona, U.S.A.) is described as new, and a key and photographs are provided for the three species in the *cognatus* group.

For more than a decade, moth collectors working in the vicinity of Peña Blanca Lake, west of Nogales, Arizona, have been finding a strikingly patterned, large cossid moth. Because of its large size and conspicuous appearance, a collector's initial response might be that he had discovered a bizarre new sphinx moth. In addition to describing that new species here, I am taking the opportunity to associate it with its previously described congeners, all 11 of which are Latin American species that have been erroneously placed, most recently, in the Old World genus *Xyleutes* Hübner, and earlier in the largely overlooked genera *Neocossus* Houlbert and *Xylotrypa* Turner.

HISTORICAL BACKGROUND

Hübner (1820: 196) erected the genus *Morpheis* for two species, *Hepialus scalaris* Fabricius (1775: 590) and *Sphinx pyracmon* Cramer (1780: 169). The former species is currently placed in the Oriental and African cossid genus *Azygophleps* Hampson (1892: 309), of which it is the type species, and the latter species was designated the type of the Neotropical genus *Morpheis* by Roepke (1957: 18), who at the same time retained *Morpheis* in the synonymy of *Xyleutes*.

In a revision of the world species of *Xyleutes*, Houlbert (1916: 89) proposed the new subgenus *Neocossus* for all but one of the American species he knew at the time; later in the same work (p. 105) he designated [*Endoxyla*] *strigillata* Felder (1874: Pl. 81, Fig. 5) as the type species. Houlbert's segregation of this subgenus was based partly on geographical distribution and on the presence of a distinctive longitudinal color stripe through the center of the forewing.

Apparently unaware of Houlbert's work, Turner (1918: 162) recognized the distinctiveness of at least one of the New World "*Xyleutes*," and, based on structural characters (palpi, tibial spurs, and venation), proposed the new genus *Xylotrypa*, with *strigillata* Felder

the type (by monotypy). *Xylotrypa* is thus a junior objective synonym of *Neocossus*, and both fall as junior subjective synonyms of *Morpheis*.

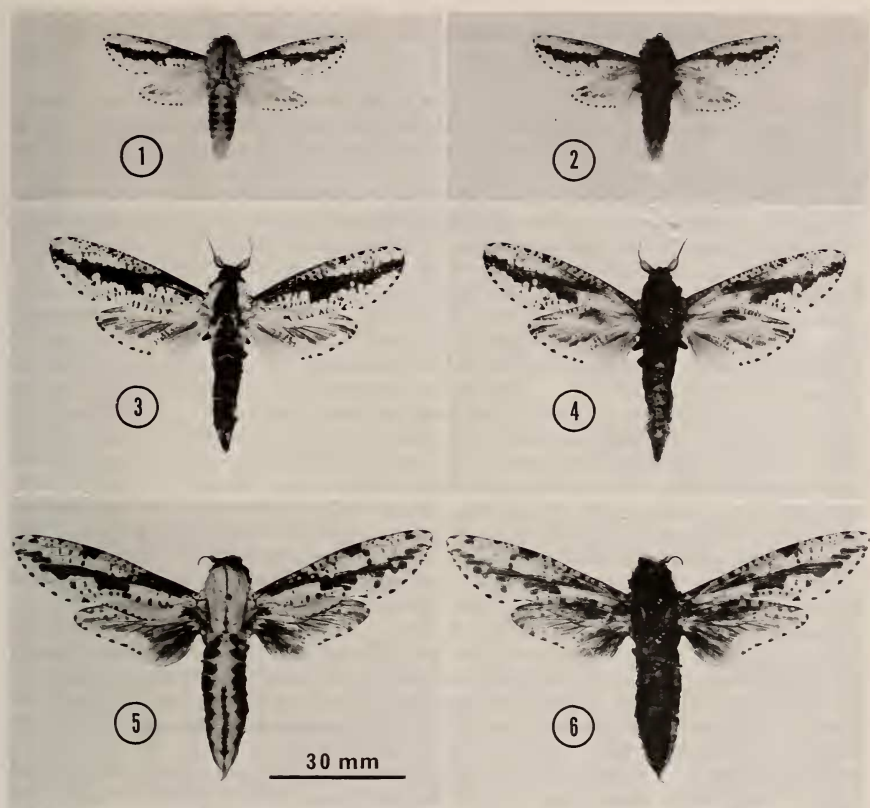
While *Morpheis* has lain in the synonymy of *Xyleutes* virtually since it was proposed, *Neocossus* and *Xylotrypa* remained overlooked or unmentioned for decades; both were omitted from *Lepidopterorum Catalogus* (Dalla Torre, 1923) and *Macrolepidoptera of the World* (Dyar & Schaus, 1937). Costa Lima (1945: 151) appears to have been the first to notice *Xylotrypa*, but treated it as a synonym of *Xyleutes*. Viette (1952: 60), in his catalog of the world genera of Cossidae, appears to have been the first to "rediscover" *Neocossus*, although he overlooked *Xylotrypa*. Roepke (1957: 18) recognized *Neocossus*, but as a synonym of *Xyleutes*, and likewise overlooked *Xylotrypa*.

#### CLASSIFICATION

As presently defined, the Zeuzerinae are easily distinguished from all other cossids, at least in the New World, by the distinctive male antennae, which are bipectinate—with long, downcurved rami—for only one-half to two-thirds the length of the shaft, and then become abruptly short uniserrate to the tip. Additionally, in members of this subfamily vein  $R_1$  on the forewing arises from the areole, or from the discal cell very near the origin of the areole. This latter condition is not unique, however, because at least two genera of Cossinae share it (*Trigena* Dyar and *Cossula* Bailey). Both sexes of these, however, may be distinguished from the Zeuzerinae by having antennae uniformly uni- or bipectinate to the tip.

*Morpheis* may be distinguished from other New World zeuzerines by the following combination of characters: a contrastingly dark, broad, irregular, longitudinal stripe on the forewing, extending from the bases of the costa and discal cell, crossing the lower outer angle of the discal cell and reaching (in well-marked species) the termen at the distal end of vein  $R_5$ ; few or no transverse wing markings; arolium absent; forewing with vein  $R_1$  arising from the areole; forewing with vein  $M_1$  arising at or very near the distal end of the chorda (the common vein dividing the areole from the discal cell); and by the prominent development of the gnathos and presence of a process on the sacculus of the male genitalia. Several American species formerly placed in *Xyleutes* (see Dyar & Schaus, 1937; Forbes, 1942) are not referable to *Morpheis*, but belong in *Psychnoctua* Grote (1866: 249) or an undescribed genus.

The type species of *Xyleutes* is the south Asian *Phalaena strix* Linnaeus (1758: 508), designated by Kirby (1897: 144), and not the



FIGS. 1-6. Adult male *Morpheis*. 1-2, *M. cognatus* (Walker), MEXICO: TABASCO: Villa Hermosa, 16 July 1963, A. R. Gillogly (LACM), dorsal (1) and ventral (2) views. 3-4, *M. clenchi*, holotype, dorsal (3) and ventral (4) views. 5-6, *M. mathani* (Schaus), PERU: Tingo Maria, 9-10 Feb. 1977, J. R. Robertson (LACM), dorsal (5) and ventral (6) views. (All to same scale.)

African *Noctua crassa* Drury (1782: Pl. 2, Fig. 1), which was designated by several subsequent authors and which has been erroneously accepted as the type species by virtually every worker in this century.

In addition to the geographical distribution and color pattern, *Morpheis* differs strikingly from *Xyleutes* Hübner (1820: 194) in the male genitalia; although the two are similar in basic structure, *Morpheis* has a massively developed gnathos (absent in *Xyleutes*) and lacks the sclerotized digitate process on the aedeagus of *Xyleutes*. Additionally, in the species of *Morpheis* examined to date, there is a digitate process on the sacculus (absent in *Xyleutes*), although it may sometimes be minute (*cognatus*).

**Morpheis clenchi** Donahue, *new species*

Fig. 3, 4, 7-9

**Diagnosis.** The strongly contrasting black (or dark brown) and white wing pattern, with reduced striations, black disc of thorax, and dark gray to blackish dorsum of abdomen readily distinguish this species. It is the largest zeuzerine known from the United States or adjacent northern Mexico.

**Male. Head:** Antennal shaft dark brown with scattered white scales, bipectinate to about one-half (24-29 segments), rami light brown, then uniserrate and dark brown to tip. **Labial palpi** cylindrical, smoothly scaled, brownish-black, first segment paler. Vestiture of **frons** fine, hair-like, semi-erect, dark brown to blackish scales with bluish reflection in certain light; scales more erect on center of frons above end of palpi, forming a bilobed tuft. **Vertex** with prominent tuft of brown, hair-like scales ventrad of base of antennae; inter-antennal area with a long shaggy "crest" of loose, brownish-black hair-like scales. **Thorax:** Vestiture of pronotum concolorous with and in continuation of inter-antennal "crest"; disc of thorax concolorous brownish-black, the scales becoming gradually more spatulate and more appressed posteriorly, with a whitish spot on posterolateral corners of metathorax. **Tegula** bright white, scales long, slender, appressed. **Venter** dark grayish brown, scales hair-like and loose. **Legs** blackish-brown, distal ends of all tibiae and tarsal segments, and tibial spurs, whitish. **Abdomen:** Vestiture of fine, hair-like, appressed scales, dorsally gray to fuscous, paler on anterior edge of each segment (forming ill-defined, narrow, transverse bands); lateral pale line present, diffuse, anteriorly white (in continuation of white posterolateral thoracic spot), posteriorly becoming grayer; venter grayish to pale brown, not or poorly differentiated from lateral coloration; genital scaling fine, hair-like, mixed gray and brownish.

**Wings.** Ground color chalky white, markings of forewing upperside brownish-black, of hindwing dark gray except for brownish-black spots on outer margin at vein ends. **Wing scales** short, spatulate, appressed, except: long, slender, with notched apex, and erect in base of forewing discal cell upperside; short, spatulate, erect in discal and accessory cells, and posteriorly to vein 2A on forewing upperside; long, hair-like on hindwing upperside in basal portion of area between discal cell and inner margin; forewing underside with mixed long hair-like and long spatulate scales in discal and accessory cells and posteriorly to vein 1A and in bases of cells between veins  $M_2$  and  $Cu_2$ . **Forewing upperside** (Fig. 3): dominant color pattern an irregular longitudinal brownish-black stripe extending distally from basal 30% of costa through discal cell to and filling basal  $\frac{3}{4}$  of cell  $M_2-M_3$ , then narrowing and continuing to outer margin in cell  $R_4-R_5$ ; the anterior edge of stripe bounded by vein  $M_2$ , with several small, dentate projections anteriorly in cell  $M_1-M_2$ ; posterior margin of stripe bounded by posterior side of discal cell with several small dentate or linear projections below discal cell, then expanding to form a large, quadrate projection from before origin of vein  $Cu_2$  to vein 1A, the posterior margin of stripe then continuing distally and irregularly across bases of cells  $Cu_2-1A$ ,  $Cu_1-Cu_2$ , and  $M_3-Cu_1$ , the last cell with one or more posterior projections partially or completely enclosing the ground color to form one or more open or closed white circles, then across cell  $M_2-M_3$ , narrowing abruptly at vein  $M_2$  and then to outer margin at end of vein  $R_5$ . This longitudinal stripe very sparsely irrorate with minute white scales (invisible to the naked eye in greasy specimens). Remaining brownish-black markings consisting of a series of small costal spots, the largest a blotch at  $\frac{2}{3}$ , at end of vein Sc, followed by smaller blotches at ends of veins  $R_1$ ,  $R_2$ , and  $R_3$ ; a series of small subcostal spots, usually complete to end of vein  $R_3$ ; a series of small spots in accessory cell; a series of small, irregular spots in cell  $R_3-R_4$ ; a series of transverse marks in cell  $R_5-M_1$ , the outermost fusing with the main longitudinal stripe; subterminal white space between veins  $M_1$  and  $Cu_2$  sparsely irrorate, occasionally appearing striate; a series of short striations in cell 1A-2A, fusing with the quadrate projection below origin of vein  $Cu_2$ ; very variable irroration of the remaining white ground color, usually most prominent as well-spaced short striations on inner margin and in cell  $Cu_2-1A$ . Fringe white except at distal end of longitudinal stripe in vicinity of end of vein  $R_5$ , and terminal spots on veins  $R_4$  to 2A. All veins concolorous

with ground color and color pattern. **Hindwing upperside** white with an irregular, prominent, broad, fuscous, striate, sub-reticulate shade through center of wing from vein 2A across lower corner of cell to outer margin at end of vein  $M_1$ , and only partially filling cell  $R_5-M_1$ ; the shade usually radiating distally along posterior margins of veins, and becoming distally striate in cells between veins  $Cu_2$  and 2A. Costa white, tending to be striate distally, with a longitudinal fuscous patch along distal end of vein  $Sc+R_1$ . Fringe white, with brownish black terminal spots on ends of veins  $R_5$  to 2A. **Underside** (Fig. 4) color pattern of both wings similar to that of upperside, ground color dusky, with the following exceptions: **Forewing underside**: basal costal patch absent, indicated only by dark leading edge of costa; longitudinal stripe originating in center of cell, formed by long gray scales in cell, and distad of cell by dark brown scales with intermixed paler scales (bluish in certain light), producing the effect of a more diffused, less well-defined pattern than on upperside; striations less sharply defined; **Hindwing underside** with additional diffuse brownish discal patch present, extending obliquely (in well-marked specimens) from anterior half of cell nearly to costa, most evident as an irregular, offset patch on vein  $Sc$  at  $1/2$ ; costa striate from this patch to near apex.

**Genitalia** (Figs. 7-9). As illustrated, proximal half of digitate process of sacculus fused to valva, the distal half free. A thorough survey of the genus is required before the significance of any differences in genitalic structure among the species can be appreciated.

**Size** (measured to nearest mm). Forewing length 28-36 mm, mean  $33 \pm 2.34$  mm ( $n = 13$ ).

**Female**. Unknown, probably similar to male in appearance but larger, with antennae uniformly filiform or minutely uniserrate.

**Early Stages**. Unknown; larva undoubtedly a borer in roots or wood, as in other members of the family.

**Types**: Holotype  $\delta$ , ARIZONA: Santa Cruz Co., 5 mi. W of Peña Blanca, 28 July 1973, at ultraviolet black light, R. Wielgus (LACM). Paratypes: 12  $\delta$ , distributed as indicated, all from ARIZONA: Santa Cruz Co. Peña Blanca Lake, Oro Blanco Mountains, 10 air mi. WNW of Nogales, elev. 3700 ft.: 2  $\delta$ , 19 July 1976, E. M. Brown & J. S. McElfresh (Brown & McElfresh); 2  $\delta$ , 24 July 1973, W. A. Harding (LACM); 1  $\delta$ , 28 July 1973, Bruce Griffin (Frack); 2  $\delta$ , 26 July 1973, R. J. Ford (1, LACM; 1, Arizona State University). Peña Blanca: 2  $\delta$ , 7 July 1972, at black light, D. C. Frack (1, LACM; 1, Frack). Peña Blanca Lake: 1  $\delta$ , 12 July 1967, K. Roever (Lloyd M. Martin). Campground, near Peña Blanca Lake, elev. 3950 ft.: 1  $\delta$ , 27 July 1976, at ultraviolet light, J. Wiseman (LACM). Sycamore Canyon: 1  $\delta$ , 16 July 1974, D. G. Marqua (Marqua).

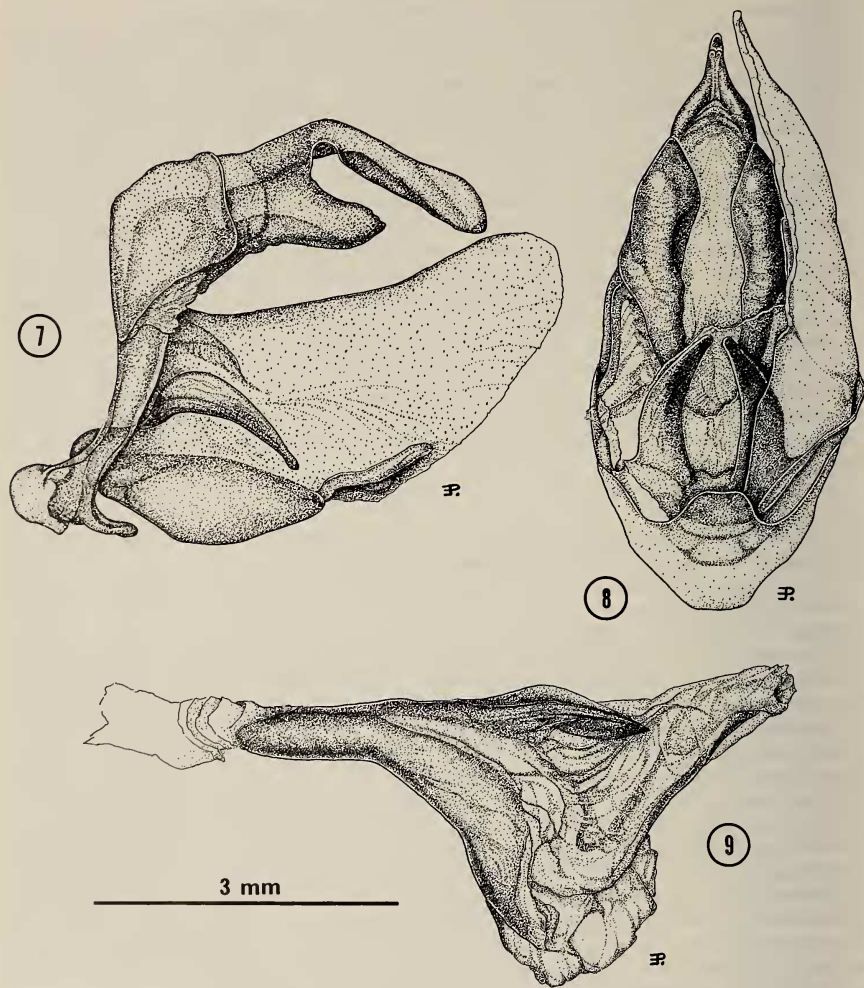
**Etymology**. I take great pleasure in naming this moth in honor of the late Harry K. Clench, who had a research interest in the Cossidae before he succumbed to the lure of fulltime work on butterflies. He generously gave me a copy of his unpublished draft revision of the New World Zeuzerinae, with his blessing to continue work where he left off. This paper is the first of a series of papers on the Cossidae, a project stimulated in large part by Harry's encouragement and cooperation.

**Remarks**. As noted above, this moth has only been collected during July, in the Peña Blanca and Sycamore Canyon area of southern Arizona. It undoubtedly occurs in adjacent Mexico, and is perhaps more widespread in Arizona.

The three known species of the *cognatus* group of *Morpheis* are distinguished from other members of the genus by the white ground color of the forewing, with strongly contrasting dark color patches, and by the greatly reduced transverse striations.

### Key to species of the *cognatus* group of *Morpheis* (males)

- 1a. Disc of thorax black, contrasting sharply with white tegulae; dorsum of abdomen dark gray to fuscous, weakly annulated with paler scales (Arizona) ..... *clenchi* Donahue, n. sp.
- 1b. Disc of thorax and tegulae concolorous, white; disc with sharply defined, narrow, longitudinal brown or black line; dorsum of abdomen white, with or without a median line..... 2



FIGS. 7-9. Male genitalia of *Morpheis clenchi*, paratypes. 7, left lateral view, aedeagus and left valva removed, ARIZONA: Santa Cruz Co., Peña Blanca Lake, Oro Blanco Mts., 10 air mi. WNW Nogales, elev. 3700 ft., 26 July 1973, R. J. Ford (LACM). 8, ventral view of same specimen, aedeagus and left valva removed. 9, left lateral view of aedeagus (vesica not fully everted), figured from a second specimen, same locality, 24 July 1973, W. A. Harding (LACM). (All to same scale.)

- 2a. Larger species (forewing length 40-50 mm); abdomen with distinct mid-dorsal black line on distal half (Peru) ..... *mathani* (Schaus)  
 2b. Smaller species (forewing length 18-30 mm); mid-dorsal dark line of abdomen indistinct or absent (Mexico to Honduras; southern limit of distribution not established) ..... *cognatus* (Walker)

Although this paper is not a generic revision, it seems appropriate to associate all those species which appear to belong to *Morpheis*. The synonymy is based largely on previously published work, but a few taxa are reclassified here as proposed by Clench (in his manuscript revision of the New World Zeuzerinae). Since I have not examined all these species and their types, this classification is tentative.

### Proposed classification and synonymy of *Morpheis*

- Morpheis* Hübner [1820: 196]; Type-species: *Sphinx pyracmon* Cramer, 1780: 169, designated by Roepke, 1957: 18. (Gender: Masculine.)
- = *Neocossus* Houlbert, 1916: 89; Type species: [*Endoxyla*] *strigillata* C. Felder, 1874: Pl. 81, Fig. 5, by original designation. New Synonymy.
  - = *Xylotrypa* Turner, 1918: 162; Type species: [*Endoxyla*] *strigillata* C. Felder, 1868: Pl. 81, Fig. 5, by original designation and monotypy. New Synonymy.
  - = *Xyleutes* of authors, in part, not Hübner [1820: 195].
- xylotribus* (Herrich-Schäffer, [1853] 1850-1858: Figs. 37, 38) (*Cossus*), New Combination.
- pyracmon* (Cramer, 1780: 169) (*Sphinx*).
- = *putridus* (Percheron, 1838: Pl. 4, Fig. 1) (*Zeuzera*), New Combination.
  - = *palmarum* (Herrich-Schäffer, [1853] 1850-1858: Fig. 36) (*Cossus*), New Combination.
  - = *fractus* (Walker, 1856: 1542) (*Zeuzera*), New Combination.
  - = *pyracmonides* (Schaus, 1901: 45) (*Duomitus*), New Combination.
- discretus* (Dyar & Schaus, 1937: 1267) (*Xyleutes*), New Combination.
- comistevus* (Schaus, 1911: 628) (*Zeuzera*), New Combination.
- lelex* (Dognin, 1891: 121) (*Zeuzera*), Revised status, New Combination.
- strigillatus* (C. Felder, 1874: Pl. 81, Fig. 5) (*Endoxyla*), New Combination.
- impeditus* (Wallengren, 1860: 44) (*Phragmataecia*) (see Gaede, 1933: 822), New Combination.
- melanoleucus* (Burmeister, 1878: 407) (*Cossus*), New Combination.
- votani* (Schaus, 1934: 95) (*Xyleutes*), New Combination.
- cognatus* (Walker, 1856: 1532) (*Zeuzera*), New Combination.
- = *mexicanus* (Houlbert, 1916: 88) (*Xyleutes*, subgenus *Neocossus*), New Combination.
- mathani* (Schaus, 1901: 45). (*Duomitus*) Revised status, New Combination.
- = *oberthueri* (Houlbert, 1916: 86) (*Xyleutes*, subgenus *Neocossus*), Emendation, Revised Synonymy, New Combination.
  - = *cognatus*, in part, in the sense of Dyar & Schaus, 1937: 1267, not Walker, 1856: 1532.
  - = *cognatus distinctus* (Bryk, 1953: 267) (*Xyleutes*), New Synonym, New Combination.
- clenchi* Donahue, new species

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